



Ambient temperature and biomarkers of heart failure: A repeated measures analysis

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Abstract:

Background: Extreme temperatures have been associated with hospitalization and death among individuals with heart failure, but few studies have explored the underlying mechanisms. **Objectives:** We hypothesized that outdoor temperature in the Boston, Massachusetts, area (1- to 4-day moving averages) would be associated with higher levels of biomarkers of inflammation and myocyte injury in a repeated-measures study of individuals with stable heart failure. **Methods:** We analyzed data from a completed clinical trial that randomized 100 patients to 12 weeks of tai chi classes or to time-matched education control. B-type natriuretic peptide (BNP), C-reactive protein (CRP), and tumor necrosis factor (TNF) were measured at baseline, 6 weeks, and 12 weeks. Endothelin-1 was measured at baseline and 12 weeks. We used fixed effects models to evaluate associations with measures of temperature that were adjusted for time-varying covariates. **Results:** Higher apparent temperature was associated with higher levels of BNP beginning with 2-day moving averages and reached statistical significance for 3-and 4-day moving averages. CRP results followed a similar pattern but were delayed by 1 day. A 5°C change in 3-and 4-day moving averages of apparent temperature was associated with 11.3% [95% confidence interval (CI): 1.1, 22.5; p Euro Surveillance (Bulletin European Sur Les Maladies Transmissibles; European Communicable Disease Bulletin) 0.03] and 11.4% (95% CI: 1.2, 22.5; p Euro Surveillance (Bulletin European Sur Les Maladies Transmissibles; European Communicable Disease Bulletin) 0.03) higher BNP. A 5°C change in the 4-day moving average of apparent temperature was associated with 21.6% (95% CI: 2.5, 44.2; p Euro Surveillance (Bulletin European Sur Les Maladies Transmissibles; European Communicable Disease Bulletin) 0.03) higher CRP. No clear associations with TNF or endothelin-1 were observed. **Conclusions:** Among patients undergoing treatment for heart failure, we observed positive associations between temperature and both BNP and CRP-predictors of heart failure prognosis and severity.

Source: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3440076>

Resource Description

Exposure : ☐

weather or climate related pathway by which climate change affects health

Air Pollution, Meteorological Factors, Meteorological Factors, Temperature, Other Exposure

Air Pollution: Ozone, Particulate Matter

Temperature: Extreme Heat

Climate Change and Human Health Literature Portal

Other Exposure: dew point

Geographic Feature: ☒

resource focuses on specific type of geography

Ocean/Coastal, Urban

Geographic Location: ☒

resource focuses on specific location

United States

Health Impact: ☒

specification of health effect or disease related to climate change exposure

Cardiovascular Effect

Cardiovascular Effect: Other Cardiovascular Effect

Cardiovascular Disease (other): levels of biomarkers of inflammation and myocyte injury

Population of Concern: A focus of content

Population of Concern: ☒

populations at particular risk or vulnerability to climate change impacts

Elderly

Resource Type: ☒

format or standard characteristic of resource

Research Article

Timescale: ☒

time period studied

Time Scale Unspecified